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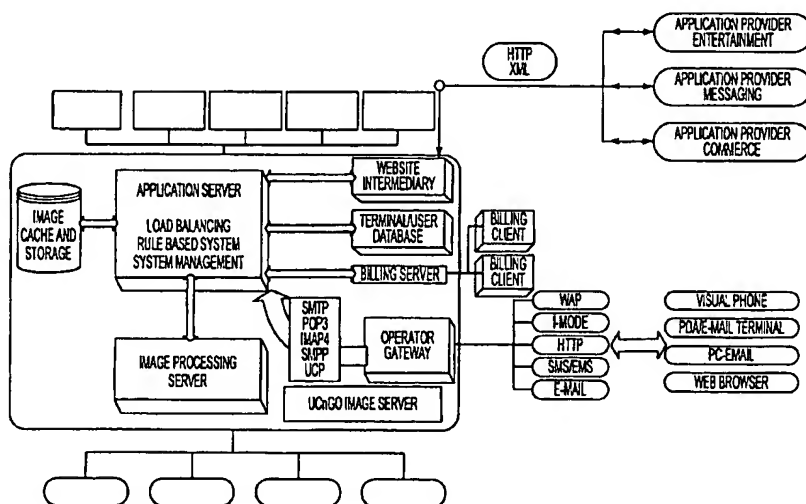
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(54) Title: IMAGE BASED OBJECT IDENTIFICATION



(57) Abstract: A system for object identification that enables users utilizing an imaging device to obtain information about, select, purchase, or perform other operation on objects. It includes an imaging device, capable of capturing one-dimensional or two-dimensional images of objects. A device capable of sending the coded image through a wired/wireless channel to remote facilities is provided. Algorithms and software for processing and analyzing the images and for extracting from them symbolic information such as digits, letters, text, logos, symbols or icons are provided. It also includes algorithms and software facilitating the identification of the imaged objects based on the information gathered from the image and the information available in databases. Further, it includes algorithms and software for offering various information or services to the user of the imaging device based on the information gathered from the image and the information available in databases.

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IMAGE-BASED OBJECT IDENTIFICATION

I. DESCRIPTION

I.A. Related Applications

- [1] The application claims priority from a co-pending U.S. Provisional Patent Application Serial No. 60/299,734 filed June 22, 2001, the contents of which are incorporated herein by reference.

I.B. Field

- [2] A visual system and method for object identification that enables users utilizing an imaging device to obtain information about, select, purchase, or perform other operation on objects. The use may be for commerce, but is not limited to the context of commerce. The object will be identified by the image or image sequence captured with the imaging device.

I.C. Background

1. Introduction

- [3] Technology has brought with it numerous methods for performing payments and commerce-related operations in the off-line world, and for gaining information about items in a commercial or non-commercial context. In the prior art, there is a separation between methods for selecting objects

about wish to gain information, methods of making purchases, and methods of payment. The present invention can replace the existing methods gaining information, for purchasing, and/or for making payments, or may combine two or all of these methods, all based on the visual identification of objects and algorithms for processing information related to such visual identification.

2. Examples of Prior Art Product Selection Methods

- [4] The following examples are prior art methods that may be enhanced and improved by application of the invention.

a) Hand held barcode scanners:

- [5] In this case, barcode scanners are attached to a computer, PDA, cellular phone, or some such similar user device. The user scans the desired product with a barcode scanner, then the product code is extracted and used to identify the product for performing a commerce related operation such as buying the product.

b) Selection from a catalog:

- [6] A buyer marks on a catalog, or a special form, which items and what quantities he/she wants to order, and sends a fax of the document as an order form. The fax may be embedded as an attached file in an email to the seller of the item.

3. Examples of Prior Art Payment Methods

- [7] The following examples of prior art methods may be enhanced and improved by application of the invention.

a) Cellular phones and wireless PDA's:

- [8] Cellular phones and wireless PDA's can be used for performing payments with the proper e-wallet software for transferring the credit card number, authenticating the user and verifying his password and/or performing biometric tests.

b) Credit cards and smart cards

- [9] Credit cards and/or smart cards are used as proof of identity for performing payments.

4. What's the problem

- [10] The main problems with conventional methods of obtaining information about objects, selecting products, and making payment are:
- [11] 1. Identification of objects is not automated in many cases, and is therefore limited to situations in which the seller or other information provider has provided a specific object reference to off-line information or other means of obtaining information about the object.
- [12] 2. Performing the payment operation requires a cumbersome procedure, such as the use of a credit card, which involves manual swiping, waiting for

the transaction to complete, and then signing or entering a PIN code on a terminal.

[13] 3. Payments using a cellular phone or PDA, can be performed by having the unit communicate wirelessly using IR, Bluetooth, acoustic signals or cellular network wireless protocols such as GSM, CDMA, etc. The checkout unit must then include a communication device that increases costs for the retailer and requires installation.

[14] 4. Alternatively, payments or product selection using a cellular phone or PDA can be performed by having the user enter into the device a phone number, a web address or some other access code which is marked on the checkout unit (and/or the product identification code) and then establish a wireless connection to a remote payment management unit. The disadvantage of this method is that the user has to enter a relatively long number/code by typing, speaking or writing (e.g., with a stylus), a process that is cumbersome and error prone.

II. SUMMARY

[15] To realize the advantages discussed above, the disclosed teachings provide:

[16] 1. An imaging device, capable of capturing one-dimensional or two-dimensional images of objects.

- [17] 2. A device capable of sending the coded image through a wired/wireless channel to remote facilities.
- [18] 3. Algorithms and software for processing and analyzing the images and for extracting from them symbolic information such as digits, letters, text, logos, symbols or icons
- [19] 4. Algorithms and software facilitating the identification of the imaged objects based on the information gathered from the image and the information available in databases.
- [20] 5. Algorithms and software for offering various information or services to the user of the imaging device based on the information gathered from the image and the information available in databases.
- [21] The present invention relates generally to image based object identification, and more specifically to a visual method for object identification. The invention enables users that utilize an imaging device to obtain information about, select, purchase, or perform other operation on objects. Each object will be identified by the image or image sequence captured with the imaging device.
- [22] Typical activities enabled by the invention are:

- [23] 1. Selecting an object for inquiring more information about it, e.g., requesting an independent review of a book one encounters in a book-store, medical information about a drug, etc.
- [24] 2. Selecting an object to add it to a virtual "shopping cart", so that the user may go through a store, quickly adding products to such a cart and then ordering them on the spot or at a later time, when reviewing the total order made.
- [25] 3. Selecting an object for performing comparison-shopping, finding the various prices for the same article of commerce by various on-line and off-line stores.
- [26] 4. Performing the payment operation by pointing at a properly marked cash register/check out counter or label. Information read by user device (which may be a mobile or fixed handheld unit, a personal computer or some such other device) will then be used to determine the type of service or product to be purchased, and the payment required.
- [27] 5. Selecting an object such as a printed discount coupon or an article of commerce, in order to receive a discount on purchase of the item.
- [28] 6. Selecting a reference for a physical object (e.g., a picture of the object, its name, its product code, or an advertisement of the product) and then performing any or all of the operations detailed in 1-5. For example, the user

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may see an item of food, then price, order, and pay for the food, all based on the visual identification of the object and the algorithms associated with the invention.

[29] 7. Selecting an object to add it to a memory. For example, the details of a business card are added to a personal phone book. As another example, the user may add the picture of a home to memory, and later use that for comparison shopping with pictures of other homes.

[30] 8. Selecting an object for registration, e.g., selection of a service that requires the transmission of the user's details like joining a member's only club or participating in a lottery.

[31] 9. Selecting an object for initiation of a phone call, connecting to a web-site, etc.

[32] The present invention, described here, solves all of these problems by enabling users utilizing an imaging device to obtain information about, select, purchase, or perform other operations on objects/products in the context of commerce or in non-commercial contexts. The object will be identified by the image or image sequence captured with the imaging device. For the act of purchasing, a credit card number transmitting can be based on the identification of the wireless device owner. Thus, the need to enter long and confusing codes or access numbers is eliminated, and at the same time robust

positive identification (including image storage as proof of purchase in cases of dispute) is provided.

[33] In these respects, the visual method for object identification in commerce according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in so doing provides an apparatus primarily developed to enable users utilizing an imaging device to obtain information about, select, purchase, or perform other operation on objects in the context of commerce or in non-commercial contexts. The object will be identified by the image or image sequence captured with the imaging device.

III. BRIEF DESCRIPTION OF THE DRAWINGS

[34] The above objectives and advantages of the disclosed teachings will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

[35] Figure 1 illustrates an aspect of the invention. The selection of an object for the purpose of inquiring more information about it.

[36] 1.1 A person is in a specific store (which may be physical or virtual).

[37] 1.2 The person takes an image of a specific book with a mobile phone (or a PDA etc.).

[38] 1.3 The image (or parts of it) is sent to a remote server. The image can include the title, the author's name or the barcode.

[39] 1.4 The person receives, to his mobile phone or any other personal device capable of receiving information, a review of the book from a web site or other relevant information.

[40] Figure 2 illustrates another aspect of the invention. The selection of an object for the purpose of adding it to a virtual "shopping cart" – thus allowing the user to go through a store, quickly adding products to such a cart and then ordering them on the spot or later when reviewing the total order made.

[41] 2.1 A person is in a store, for example, a grocery store.

[42] 2.2 The person sees a product of interest

[43] 2.3 The person takes an image of the product with a PDA or a cellular device. The product is added to the person's shopping list

[44] 2.4 The person repeats actions 2.2 & 2.3 and enlarges the shopping list.

[45] 2.5 The order is made based on the shopping list.

[46] 2.6 The payment is made based on the shopping list.

[47] Figure 3 illustrates another aspect of the invention. The selection of an object from a catalog, for the purpose of making a purchase order.

[48] 3.1 A person looks at a fashion catalog

[49] 3.2 A product is selected and photographed directly from the catalog using a cellular telephone, PDA or any other device capable of taking a picture.

- [50] 3.3 The product is added to the shopping list
- [51] 3.4 The order and payment is made based on the shopping list.
- [52] Figure 4 illustrates another aspect of the invention. Performing a payment operation by pointing at a properly marked cash register/check out counter/label.
- [53] 4.1 A person is in a parking lot.
- [54] 4.2 The person, in this case perhaps a parking lot attendant, points at a plate containing information about the payment action required and takes a picture of the plate.
- [55] 4.3 The payment is performed and the parking lot's gate is open (It will be appreciated, however, that this method can be totally automated, without any human involvement.)
- [56] Figure 5 illustrates another aspect of the invention. Uploading a coupon or other evidence of a discount, to be used later when purchasing a specific item.
- [57] 5.1 A person reads a newspaper containing a coupon
- [58] 5.2 The coupon is photographed using a cellular phone, PDA or any other device capable of taking a picture.
- [59] 5.3 The coupon is stored.
- [60] 5.4 When a product is bought the person gets a discount using the coupon directly from the cellular phone, PDA or other imaging device.

- [61] Figure 6 illustrates the flow of events for one of the above applications (purchasing through a catalog), and outlines the technical issues involved in its implementation.
- [62] 6.1 A person presses the UCnGO button on a wireless device to operate a digital camera. (It will be appreciated that the invention will operate with any device capable of taking a digital photograph.)
- [63] 6.2 The microprocessor inside the device takes a single photo using default parameters for the photographic action.
- [64] 6.3 The image is analyzed and the optimal exposure time for the next photo is determined. A second photo is taken according to the new parameters. The second photograph may be taken by the user or may be taken automatically by the imaging device.
- [65] 6.4 The part of interest (e.g. the serial number of the requested product in a catalog, the digits of a barcode, a phone number for customer services etc.) is extracted from the entire image and is compressed.
- [66] 6.5 The image is transmitted to and received by a base station.
- [67] 6.6 The image information and the identification of the user is transferred from the base station to UcnGO's servers, or other server, through an IP net, or other digital network.